Duodenocaval fistula: A life-threatening condition of various origins

Philippe G. Guillem, MD,[a] Daniel Binot, MD,[b] Jean Dupuy-Cuny, MD,[b] Jean Eric Laberenne, MD,[c] Jocelyn Lesage, MD,[b] Jean-Pierre Triboulet, MD,[a] and **Jean-Pierre Chambon, MD,[d]** *Lille cedex, Boulogne, and Valenciennes, France*

We report on two cases of duodenocaval fistula. The first patient, a 73-year-old man, had sepsis and occult digestive bleeding. We diagnosed a fistula that resulted from a right nephrectomy and subsequent radiotherapy for a urothelial tumor 20 months earlier. The second patient, a 60-year-old woman, complained of right abdominal pain. A duodenocaval fistula that was caused by duodenal perforation by a migrating caval filter placed 10 years earlier was revealed by means of endoscopy. Both patients had a successful operation to treat the condition. An extensive review of the literature disclosed 35 other cases and identified two factors of good prognosis: duodenocaval fistulas caused by migrating caval filters and early surgery. (J Vasc Surg 2001;33:643-5.)

Duodenocaval fistulas may exceptionally occur because of the proximity of the duodenum and inferior vena cava. Their diagnosis is classically based on the association of digestive bleeding and a septic syndrome.[1] We report two cases of duodenocaval fistula and extensively review the world literature, with special attention to etiology, clinical diagnosis, and management.

CASE REPORTS

Case 1. A 73-year-old man had fever and chills. His medical history included right nephrectomy and adjuvant radiotherapy 20 months earlier for a pyelic urothelial tumor. He had experienced fever (39°C) and chills for 3 weeks, he was weak, and he had lost 4 kg. On admission, laboratory test results showed a white cell count of 13,200 mL and microcytic anemia (hemoglobin level, 9 g/dL).

Evidence of several digestive tract bacteria, including *Klebsiella oxytoca, Escherichia coli, Streptococcus oralis,* and *Candida albicans*, was disclosed by means of several hemocultures. Melena appeared during the hospital stay. A healthy esophagus, stomach, and duodenum were disclosed by means of an upper digestive tract endoscopy, with the exception of a congested appearance of the first duodenal portion. Dye leakage into the inferior vena cava was shown by means of a water-soluble contrast swallow radiograph (Fig 1). The presence of a duodenocaval fistula was confirmed by means of an abdominal spiral computed tomography (CT) scan, whereas thrombosis of the suprarenal inferior vena cava was demonstrated by means of ultrasonography. An emergency laparotomy was performed because of a septicemia.

Dense retroperitoneal fibrosis related to the right nephrectomy and radiotherapy surrounded the inferior vena cava and the second section of the duodenum. After sharp dissection, duodenal mobilization, and digital control of bleeding, we sutured both the inferior vena cava and the duodenum. To avoid fistula recurrence, we performed duodenal exclusion by means of gastroenterostomy and antral stapling, truncal vagotomy, and epiploic patch interposition. Additional medical treatment included blood transfusion and antibiotics. The postoperative course was marked by cardiorespiratory failure and a subhepatic abscess, which was drained through an elective surgical approach. Duodenal leakage was progressively dried with a somatostatin analog. The results of a subsequent control water-soluble contrast swallow radiography were normal. The patient was discharged after 37 days in the hospital. Six months later, his symptoms had completely disappeared, and the patient tolerated a regular diet.

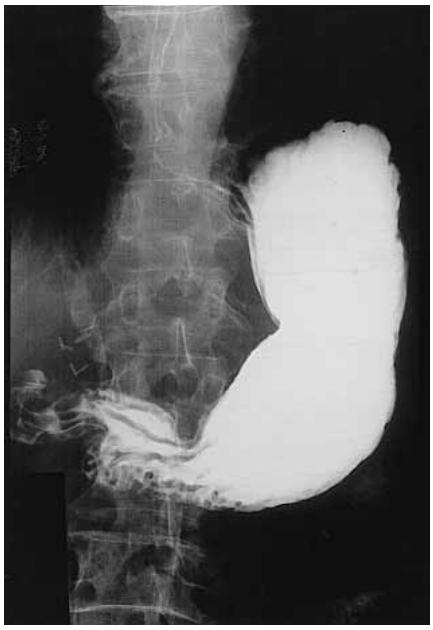

Fig 1. Water-soluble contrast swallow radiography demonstrating direct opacification of inferior vena cava from duodenocaval fistula.

Case 2. A 60-year-old woman was seen for abdominal pain. Her medical history included the placement of a caval filter 10

From the Service de Chirurgie Digestive et Générale, Hôpital Huriez, CHRU de Lille[a]; Clinique de la Côte d'Opale, Saint-Martin les Boulogne[b]; Service de Gastroentérologie, CH de Valenciennes[c]; and Service de Chirurgie Adulte Quest, Hôpital Huriez.[d]

Competition of interest: nil.

Reprint requests: Philippe Guillem, Service de Chirurgie Digestive et Générale, Hôpital Huriez, Rue Michel Polonovski, CHRU de Lille, France (e-mail: guillem.philippe@wanadoo.fr).

0741-5214/2001/$35.00 + 0 **24/4/111741**
doi:10.1067/mva.2001.111741

Fig 2. Transverse abdominal CT scan showing protrusion of caval filter's strut into duodenal lumen (*arrowhead*).

Etiology and prognosis of reported cases of duodenocaval fistula*

Etiology	*No. of cases*	*No. of deaths*
Migrating caval filter	10 (27%)	1 (10%)
Right nephrectomy and radiotherapy	10 (27%)	6 (60%)
Peptic duodenal ulcer	7 (19%)	4 (60%)
Ingested foreign body	6 (16%)	3 (50%)
Abdominal injury	3 (8%)	0
Lymphatic recurrence of a colon cancer	1 (3%)	1
Total	37	15 (40%)

*Case references are all available from the authors. The total number includes our two cases.

years earlier for thrombophlebitis and recurrent pulmonary infarction. She had right abdominal and lumbar pain that appeared 3 months earlier. The results of a clinical examination were unremarkable, without any evidence of sepsis or digestive bleeding. The results of a stool guaiac test were negative. The results of abdominal ultrasonography proved normal, with the exception of a slight choledochal dilatation. A metallic strut protruding into the lumen of the fourth duodenal portion was discovered by means of an upper digestive tract endoscopy. The presence of a duodenocaval fistula was confirmed by means of an abdominal CT scan (Fig 2). Because the patient had persistent pain, a laparotomy was performed. The duodenocaval fistula was dissected, and a two-layer suture of the duodenal wall was performed. The caval filter was removed through a caval incision. The inferior vena cava was sutured with a prosthetic patch. Postoperative bleeding led us to reoperate on the third day to ligature a disrupted venous collateral branch. The postoperative course was subsequently uneventful. Six months later, the patient was doing well.

DISCUSSION

We report two cases of duodenocaval fistulas. In an extensive review of the world literature, we gathered 35 other cases to assess etiology, clinical presentation, management, and outcome.

We found that patients were predominantly men (75%), with a mean age of 50 years (range, 19-73 years). Half of the duodenocaval fistulas were traumatic in origin (Table), caused by a penetrating abdominal injury[1] or the migration of an ingested foreign body (toothpick or chicken bone)[2,3] or a caval filter,[4,5] as in our second patient. Such an event is usually a late complication, because the time between caval filter placement and the occurrence of the fistula was on average 6 years (range, 7 days to 11 years; the period was 1 year for case 2 in our study). Combined right nephrectomy and adjuvant radiotherapy, as in case 1, is the second most common etiology (25% of the cases).[6-8] Only two cases of nine were associated with tumor recurrence,[7,8] suggesting that duodenocaval fistula is mostly related to fibrosis and postradiation damage in the mucosa (a duodenal ulcer is frequently associated with the fistula). Again, it is a long process, because the time between surgery and fistula occurrence was on average 26 months (range, 6-120 months). Peptic ulcers were responsible for the remaining cases.[9,10] Only large ulcers accounted for duodeno-

caval fistula, because the mean ulcer diameter was 4.4 cm (range, 1.5-9 cm).

Patients with fistulas between the digestive tract and vascular tree classically have the association of sepsis and digestive tract bleeding.[1] Although 25 (70%) of the 36 patients with duodenocaval fistula complained of at least one of these signs, only 16 patients (45%) demonstrated both septic- and bleeding-related manifestations. Signs ranged from isolated fever[4] to lethal septic shock[6] and from occult blood in stools[10] to lethal hypovolemic shock.[8] Because symptoms are so nonspecific, diagnosis is mainly based on the results of radiologic studies, including barium swallows, ultrasonography, and CT scans. Although in theory it may potentially cause air embolism,[6] upper digestive endoscopy can draw attention to the duodenum and can be a means of revealing a duodenal ulcer,[6-8] as it was in 18 of the reported patients (50%), or a protruding metallic strut in the lumen,[5] as it was in case 2. Water-soluble contrast swallow radiographs and abdominal ultrasonography may be useful diagnostic adjuncts,[3,10] but an abdominal CT scan is the most contributive morphologic exploration and is a means of demonstrating either caval thrombosis,[2] a periduodenal abscess,[7,9] an incarcerated foreign body,[3] or a migrated caval filter.[5] It can also be an indirect means of revealing the duodenocaval fistula by showing hyperdense hepatic and splenic images because of venous passage of ingested contrast.[10]

Duodenocaval fistulas are life threatening; 15 (40%) of the 37 patients died. The mechanism by which the fistula occurs is a prognostic criterion; the mortality rate is high (50%-60%) for every etiology, with the exception of migrating caval filters (10%; Table). In such cases, a good outcome is probably attributable to early diagnosis; morphologic examinations performed because of abdominal symptoms (mostly pain) were systematically diagnostic by directly showing the migrated device or duodenal perforation.[4] Prognosis is also good in patients with abdominal injury, probably because early surgery is usually performed in such emergency situations.[1]

The second prognosis-related criterion is surgery itself; although some deaths occurred despite surgery (because of severe sepsis or bleeding),[9] most of the patients died before they could have an operation.[6,8] Pancreaticoduodenectomy with gastrojejunostomy and choledochojejunostomy has sometimes been performed,[7] but like most authors, we preferred simple suture of the duodenal perforation. Likewise, the inferior vena cava is usually sutured and rarely divided or excised.[2,4,7] Half the surgical procedures included measures to prevent recurrence of the fistula: epiploic or jejunal patch,[1] truncal vagotomy,[9,10] antrectomy,[9,10] and/or duodenal exclusion.[9] These measures are particularly recommended for duodenocaval fistula caused by peptic ulcers or radiation-induced duodenal ulcers. They appear to be effective, because no recurrence of duodenocaval fistula has been reported. However, morbidity rates remain high, because only 11 (39%) of the 28 patients who had surgery eventually became well postoperatively,[2-5,7] pointing to the extreme seriousness of the disorder.

REFERENCES

1. DuPriest RW Jr, Khaneja SC, Ayella R, Cowley RA. Sepsis and upper gastrointestinal hemorrhage due to duodenal-caval fistula: complications of delayed treatment of a penetrating abdominal injury. J Trauma 1979;19:275-7.
2. Allen B, Krupski WC, Wylie EJ. Toothpick perforation of the inferior vena cava. West J Med 1983;138:727-30.
3. Rioux M, Lacourciere L, Langis P, Rouleau M. Sonographic detection of ingested foreign bodies in the inferior vena cava. Abdom Imaging 1997;22:108-10.
4. Irvin GL. Duodenal perforation with a vena caval umbrella. Am Surg 1972;38:635-7.
5. Dardik A, Campbell KA, Yeo CJ, Lipsett PA. Vena cava filter ensnarement and delayed migration: an unusual series of cases. J Vasc Surg 1997;26:869-74.
6. Christl SU, Scheppach W, Peters U, Kirchner T. Cerebral air embolism after gastroduodenoscopy: complication of a duodenocaval fistula. Gastrointest Endosc 1994;40:376-8.
7. Benjamin DS, Ruckle HC, Hadley HR. Local recurrence of renal cell carcinoma causing duodenal-inferior vena caval fistula: case report and review of the literature. Urology 1996;48:636-8.
8. O'Keefe GE, Procyshyn AW. Duodenocaval fistulas. Can J Surg 1992;35:347-9.
9. deSa LA, Roddie ME, Williamson RC. Fatal duodenocaval fistula resulting from a giant peptic ulcer. Acta Chir Scand 1990;156:647-50.
10. Vitellas KM, Stone JA, Bennett WF, Mueller CF. The hyperdense liver and spleen: a CT manifestation of barium embolization through a duodenocaval fistula. AJR Am J Roentgenol 1997;169:915-6.

Submitted Feb 23, 2000; accepted Jun 6, 2000.